

U.S. Patent Application Serial No. 10/665,204
Amendment filed February 21, 2006
Reply to OA dated November 18, 2005

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1 - 13 (Canceled)

Claim 14 (Currently Amended): ~~The semiconductor light-receiving device as claimed in claim 1~~ A semiconductor light-receiving device comprising:

a semi-insulating substrate;

a semiconductor layer of a first conduction type that is formed on the semi-insulating substrate;

a buffer layer of the first conduction type that is formed on the semi-insulating substrate and has a lower impurity concentration than the semiconductor layer of the first conduction type;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conduction type that is formed on the light absorption layer; and

a semiconductor intermediate layer that is interposed between the buffer layer and the light absorption layer, and has a forbidden bandwidth within a range lying between the forbidden

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bandwidth of the buffer layer and the forbidden bandwidth of the light absorption layer,

wherein the semi-insulating substrate has a light receiving surface on the bottom surface thereof.

Claim 15 (Canceled)

Claim 16 (Canceled)

Claim 17 (Previously presented): A semiconductor light-receiving device comprising:

a semi-insulating substrate;

a semiconductor layer of a first conduction type that is formed on the semi-insulating substrate;

a buffer layer of the first conduction type that is formed on the semiconductor layer;

a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;

a semiconductor layer of a second conduction type that is formed on the light absorption layer; and

a high-concentration semiconductor intermediate tunneling layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer, the semiconductor intermediate tunneling layer allowing

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electrons to pass therethrough to the buffer layer due to a tunnel effect.

Claim 18 (Original): The semiconductor light-receiving device as claimed in claim 17, wherein the impurity concentration of the buffer layer is lower than $1 \times 10^{17} \text{ cm}^{-3}$.

Claim 19 (Previously Presented): The semiconductor light-receiving device as claimed in claim 17, wherein the high-concentration semiconductor intermediate tunneling layer has an impurity concentration of $2 \times 10^{18} \text{ cm}^{-3}$, and a film thickness of 100 nm or smaller.

Claim 20 (Original): The semiconductor light-receiving device as claimed in claim 17, further comprising a contact layer of the first conduction type that is interposed between the semi-insulating substrate and the buffer layer, the contact layer having a high impurity concentration, with a predetermined potential being supplied to the contact layer.

Claim 21 (Original): The semiconductor light-receiving device as claimed in claim 17, wherein at least the light absorption layer and the semiconductor layer of the second conduction type form a mesa structure, with light entering the light absorption layer through a side surface of the light absorption layer that is exposed in a process of forming the mesa structure.

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Claim 22 (Original): The semiconductor light-receiving device as claimed in claim 21, further comprising a semiconductor optical waveguide path that is formed on the semi-insulating substrate and guides light to the light absorption layer.

Claim 23 (Previously Presented): A semiconductor light-receiving device comprising:

- a semiconductor substrate of a first conduction type;
- a buffer layer of the first conduction type that is formed on the semiconductor substrate and has a lower impurity concentration than the semiconductor substrate;
- a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;
- a semiconductor layer of a second conduction type that is formed on the light absorption layer; and
- a high-concentration semiconductor intermediate tunneling layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer, the semiconductor intermediate tunneling layer allowing electrons to pass therethrough to the buffer layer due to a tunnel effect.